

Attorney Docket: P-15149
Serial No.: 09/431,159
Filed: November 1, 1999

In the Claims:

Please amend claim 12 and add newly submitted claims 13-15 as follows.

1. (Currently amended) Apparatus of processing heavy hydrocarbon feed ~~comprising~~ consisting essentially of:
 - a) a heater for heating said heavy hydrocarbon feed;
 - b) an atmospheric fractionating tower for fractionating the heated heavy hydrocarbon feed fed to the inlet of the atmospheric fractionating tower producing light atmospheric fractions and atmospheric bottoms;
 - c) a further heater for heating said atmospheric bottoms and producing heated atmospheric bottoms;
 - d) a vacuum fractionating tower for fractionating said heated atmospheric bottoms and producing light vacuum fractions and vacuum residue;
 - e) a solvent deasphalting (SDA) unit for producing deasphalting oil (DAO) and asphaltenes from said vacuum residue;
 - f) a deasphalting oil thermal cracker for thermally cracking said deasphalting oil (DAO) and producing thermally cracked deasphalting oil, a thermally cracked deasphalting oil connector connecting an outlet of said deasphalting oil thermal cracker to an inlet of said first fractionating tower, said first fractionating

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tower being said atmospheric fractionating tower, by way of a line so that only said thermally cracked deasphaltered oil is recycled to the inlet of said atmospheric fractionating tower by way of said line; and

g) a light vacuum fraction thermal cracker for thermally cracking said light vacuum fractions for producing thermally cracked light vacuum fractions, a thermally cracked light vacuum fractions connector connecting an outlet of said light vacuum fraction thermal cracker to an inlet of said first fractionating tower, said first fractinating tower being said atmospheric fractionating tower, by way of a line so that only said thermally cracked light vacuum fractions is recycled to the inlet of said atmospheric fractionating tower by way of said line.

2. (Canceled)
3. (Canceled)
4. (Canceled)
5. (Canceled)
6. (Canceled)
7. (Canceled)
8. (Canceled)
9. (Canceled)

10. (Canceled)

11. (Currently amended) Apparatus according to claim 1 including means for supplying only the heavy portion of said light vacuum fractions to said ~~further~~ light vacuum fraction thermal cracker.

12. (Currently amended) Apparatus according to claim 2 11 including a hydrogen donor system for processing a portion of said light atmospheric fractions produced by said atmospheric fractionating tower and producing a hydrogen donor stream, said hydrogen donor system including:

- a) a hydrotreater for producing a treated hydrocarbon feed from said portion of said light atmospheric fractions produced by said atmospheric fractionating tower;
- b) a still further heater for producing a heated, treated hydrocarbon stream;
- c) a further atmospheric fractionating tower for fractionating said heated, treated hydrocarbon stream for producing further light atmospheric fractions and further atmospheric bottoms;

- d) an additional heater for heating said further atmospheric bottoms and producing heated further atmospheric bottoms; and
- e) a further vacuum fractionating tower for fractionating said heated further atmospheric bottoms and producing further lighter vacuum fractions and further vacuum residue wherein a portion of the heavier portion of said further lighter vacuum fractions or hydrogen donor stream is supplied to said deasphalting oil thermal cracker and a further portion of the heavier portion of said further lighter vacuum fractions or hydrogen donor stream is supplied to said light vacuum fraction thermal cracker.

13. (New) A method for processing a heavy hydrocarbon feed comprising:

- a) supplying said heavy hydrocarbon feed to a heater for heated said heavy hydrocarbon feed;
- b) supplying said heated heavy hydrocarbon feed to an atmospheric fractionating tower for fractionating the heated heavy hydrocarbon feed fed to the inlet

of the atmospheric fractionating tower producing light atmospheric fractions and atmospheric bottoms;

- c) supplying said atmospheric bottoms to a further heater for heating said atmospheric bottoms and producing heated atmospheric bottoms;
- d) supplying said heated atmospheric bottoms to a vacuum fractionating tower for fractionating said heated atmospheric bottoms and producing light vacuum fractions and vacuum residue;
- e) supplying said vacuum residue to a solvent deasphalting (SDA) unit for producing deasphalting oil (DAO) and asphaltenes from said vacuum residue;
- f) supplying said deasphalting oil to a deasphalting oil thermal cracker for thermally cracking said deasphalting oil and producing a thermally cracked product which is recycled to the inlet of said atmospheric fractionating tower; and
- g) supplying said light vacuum fractions to a light vacuum fraction thermal cracker for thermally cracking said light vacuum fractions for producing a further cracked product which is recycled to the

inlet of said atmospheric fractionating tower.

14. (New) The method according to claim 13 further including the step of supplying only the heavy portion of said light vacuum fractions to said further thermal cracker.

15. (New) The method according to claim 14 including the step of supplying said light atmospheric fractions produced by said atmospheric fractionating tower to a hydrogen donor producing system for processing a portion of said light atmospheric fractions produced by said atmospheric fractionating tower and producing a hydrogen donor stream, said method further including the steps of:

- a) supplying a portion of said light atmospheric fractions produced by said atmospheric fractionating tower to a hydrotreater for producing a treated hydrocarbon feed;
- b) supplying said treated hydrocarbon feed to a still further heater for producing a heated, treated hydrocarbon stream;
- c) supplying said heated, treated hydrocarbon stream to a further atmospheric fractionating tower for fractionating said heated, treated hydrocarbon

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stream for producing further light atmospheric fractions and further atmospheric bottoms;

d) supplying said further atmospheric bottoms to an additional heater for heating said further atmospheric bottoms and producing heated further atmospheric bottoms; and

e) supplying said heated further atmospheric bottoms to a further vacuum fractionating tower for fractionating said heated further atmospheric bottoms and producing further lighter vacuum fractions and further vacuum residue wherein a portion of the heavier portion of said further lighter vacuum fractions or hydrogen donor stream is supplied to said deasphalting oil thermal cracker and a further portion of the heavier portion of said further lighter vacuum fractions or hydrogen donor stream is supplied to said light vacuum fraction thermal cracker.